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Pesticide Fact Sheet Number 9: Diuron

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15. Supplementary Notes

16. Abstract (Limit: 200 words)

This document contains up-to-date chemical information, including a summary of the Agency's regulatory position and rationale, on a specific pesticide or group of pesticides. A Fact Sheet is issued after one of the following actions has occurred.

1. Issuance or reissuance of a registration standard,
2. Issuance of each special review document,
3. Registration of a significantly changed use pattern,
4. Registration of a new chemical, or
5. An immediate need for information to resolve controversial issues relating to a specific chemical or use pattern.

17. Document Analysis a. Descriptors

Pesticides, regulations, Chemical Information Fact Sheet, Use Patterns, Science Findings

b. Identifiers/Open-Ended Terms

c. COSATI Field/Group

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Office of Pesticide Programs (TS-768C)
Washington, DC 20460

EPA

Pesticide Fact Sheet

Name of Chemical: DIURON
Reason for Issuance:
Date Issued: Sept. 30,1983
Fact Sheet Number: 9

1. Description of the chemical:

Generic name: 3-(3,4-Dichlorophenyl) 1,1-dimethylurea ($C_9H_{10}Cl_2N_2O$)
Common name: Diuron
Trade name: Cekiuron®, Dailon®, Diater®, Di-on®, Diurox®, Diurol®, Drexel Diuron 4L®, Dynex®, Karmex®, Unidron®, Urox® and Vonduron®
EPA Shaughnessy Code: 035505
Chemical Abstracts Service (CAS) Registry number: 150-68-5
Year of initial registration: 1966
Pesticide Type: Herbicide
Chemical family: Substituted urea
U.S. and foreign producers: E.I. duPont de Nemours and Company, Vertac Chemical Corp., Bayer AG, Makhteshim-Agan, Pennwalt Holland B.V., Rhone-Poulenc, Staveley Chemicals Ltd., Universal Crop Protection Ltd.

2. Use patterns and formulations:

Application sites: Diuron is a substituted urea compound registered for use as a herbicide to control a wide variety of annual and perennial broadleaf and grassy weeds on both crop and noncrop sites. Diuron is registered for use on numerous crop sites such as forage crops, field crops, fruits, vegetables, nuts, and ornamental crops. In noncrop applications, diuron is used on industrial sites, on rights-of-way, around farm buildings, and on irrigation and drainage ditches.

Types of formulations: Diuron is available in wettable powder, granular, flowable, pelleted/ tableted, liquid suspension, and soluble concentrate formulations.

Types and methods of applications: Diuron is applied as follows: broadcast or banded on soil surface using ground or aerial equipment.

Application rates: 0.6 lbs. a.i./A to 8.0 lbs. a.i./A on crop sites; and 15.0 lbs. a.i./A to 48.0 lbs. a.i./A on non-crop sites.

Usual carriers: Water, oil and clay.

3. Science Findings:

Summary science statement:

Diuron has low acute toxicity and it's uses are not expected to affect avian wildlife. But diuron is structurally related to linuron, whose studies have exhibited testicular adenomas in rats and liver cell adenomas in female mice. Therefore, the protocols for related chronic studies of diuron should reflect the oncogenic concerns raised by the linuron data.

Chemical characteristics:

Technical diuron is a white, crystalline, odorless solid. It is stable towards oxidation and moisture under conventional conditions and decomposes at 180-190°C. The chemical does not exhibit any unusual handling hazards.

Toxicological characteristics:

Acute toxicology studies on diuron are as follows:

Oral LD_{50} in rats: 3,400 mg/kg body weight, Toxicity Category III
Dermal LD_{50} in rabbits: > 20,000 mg/kg body weight, Toxicity Category IV
Skin irritation in rabbits: mild irritant, Toxicity Category IV
Eye irritation in rabbits: mild conjunctival irritant, Toxicity Category IV.

Chronic toxicology studies on diuron are as follows:

The requirement for a subchronic inhalation study is being deferred until an acute inhalation study has been completed.

In a two-year chronic feeding study, the no-observed-effect-level (NOEL) was 25 ppm in male and female rats. No evidence of tumorigenicity was found.
In a two-year feeding study, the no-observed-effect-level in dogs was 25 ppm. No evidence of tumorigenicity was found.

Major routes of human exposure:

Current data does not indicate that the U.S. population is exposed to diuron through the dietary or non-dietary routes.

Physiological and Biochemical Behavioral Characteristics:

Foliar absorption characteristics: Diuron is most readily absorbed through the root system.
Translocation: Diuron is translocated upward primarily in the xylem.
Mechanism of pesticidal action: It is a strong inhibitor of photosynthesis (Hill reaction).

Environmental characteristics:

Adsorption and leaching characteristics in basic soil types: Diuron's adsorption increases as clay content and/or organic matter content of soil increases.
Microbial breakdown: Microbes are the primary factor in the breakdown of diuron in soils and the aquatic environment.
Loss from photodecomposition and/or volatilization: Diuron's loss from photodecomposition is minimal.

Ecological characteristics:

Avian oral LD_{50}: >2,000 ppm
Avian dietary LC_{50}: >1,730 ppm
Fish LC_{50}: 3 to 60 ppm.

Potential problems for endangered species: Additional ecological effects data must be submitted before a complete hazard assessment can be made.

Tolerance assessments:

Tolerances are currently established for residues of the herbicide 3-(3,4-Dichlorophenyl) 1,1-dimethylurea in or on the following raw agricultural commodities:

0.1 ppm (Negligible residues) in Bananas, Nuts, and Peaches;

0.5 ppm in Papayas;

1.0 ppm in Apples; Artichokes; Barley grain; Blackberries; Blueberries; Boysenberries; Fat of cattle, goats, hogs, horses, and sheep; Meat of cattle, goats, hogs, horses, and sheep; Meat Byproducts of cattle, goats, hogs, horses, and sheep; Citrus fruits; Field corn, ear, and grain; Popcorn, ear; Sweetcorn, ear; Cotton, seed; Currants; Dewberries; Gooseberries; Grapes; Huckleberries; Loganberries; Oats grain; Olives; Pears; Peas; Pineapple; Potatoes; Raspberries; Rye grain; Sorghum grain; Sugarcane; Vetch, seed; and Wheat grain;

2.0 ppm in Alfalfa; Barley forage, hay, and straw; Clover forage and hay, Corn fodder and forage; Popcorn fodder and forage; Sweetcorn fodder and forage; Grass crops and grass hay (except Bermuda grass and Bermudagrass hay); Rye forage, hay, and straw; Pea forage and hay; Peppermint hay; Sorghum forage and fodder; Oats forage, hay, and straw; Trefoil, birdsfoot forage and hay; Vetch forage and hay; Wheat forage, hay, and straw;

4.0 ppm (food additive) in Dried citrus pulp;

7.0 ppm in Asparagus; and Bermudagrass and Bermudagrass hay.

A reassessment of the diuron tolerances indicates that those originally set for certain commodities in 40 CFR, § 180.106 were too high. The Agency will propose the reduction of certain tolerances during the next year.

Problems known to have occurred with use:

The Pesticide Incident Monitoring System (PIMS) indicated several incidents involving diuron alone from 1971 to 1980. Two fish kills were reported after aquatic areas were sprayed for weed control and the dying weeds depleted the water of oxygen. Three instances of crop injury were reported involving an accidental aerial application, the rotation of a sensitive crop onto previously treated land, and injury to wheat resulting from wet weather. Two applicators received medical attention after exposure from spraying. Symptoms included vomiting, dizziness, and diarrhea. No fatalities were reported. PIMS is a voluntary reporting system and does not include detailed followup or validation of reported incidents.

4. Summary of regulatory position and rationale:

Use classification:

General use classification:

Use, formulation, or geographical restrictions:

No use, formulation, or geographical restrictions are required.

Unique label warning statement:

Reserved pending filling data gaps.

Summary of risk/benefit review:
No risk/benefit assessment was conducted.

5. Summary of major data gaps:

The following toxicology data are required within 48 months after receipt of this guidance package unless otherwise noted:

Two oncogenicity tests are required, one in rat and one in another species,
Two teratogenicity studies are required, one in rat and one in another species (rabbit),

The following mutagenicity data are required:
A test for gene mutations in bacterial (Salmonella typhimurium) plate test,
A test for gene mutation in mammalian cells in culture,
A test for DNA repair induction: in vivo mammalian sister chromatid exchange test,
A test for chromosome effects (either in vivo or in vitro mammalian chromosome aberration analysis.

An acute inhalation study is required within 6 months after receipt of this guidance package.

The following environmental fate data are required within 48 months after receipt of this guidance package:

Hydrolysis test,
Photodegradation test in water,
Photodegradation test in soil,
Metabolism test in anaerobic soil,
Metabolism test in aerobic aquatic site,
Mobility (volatility) test in the lab,
Mobility (volatility) test in the field,
Dissipation study in soil,
Dissipation study in an aquatic site.

The following ecological effects data are required: within 48 months after receipt of this guidance package.

Acute and chronic tests of diuron on estuarine fish, shrimp, and oysters.

An aquatic field study may be needed for the aquatic uses pending the outcome of the environmental fate studies.

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